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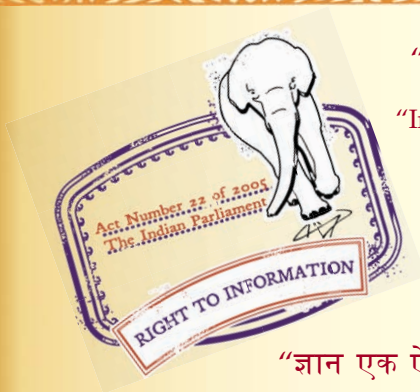
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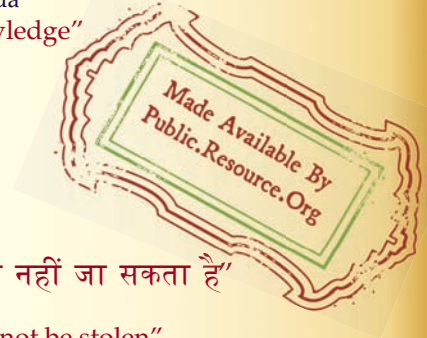
IS 11686 (1997): Isopropyl Alcohol, Food Grade [FAD 8: Food Additives]



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“Knowledge is such a treasure which cannot be stolen”

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आइसोप्रोपाइल अलकोहल, खाद्य ग्रेड — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard

**ISOPROPYL ALCOHOL, FOOD GRADE —
SPECIFICATION**

(First Revision)

ICS 67.220.20 ; 71.080.60

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Food Additives Sectional Committee had been approved by the Food and Agriculture Division Council.

With the increased production of processed foods, manufacturers have started adding a large number of substances, generally in small quantities, to improve the appearance, flavour, texture or storage properties, etc, of the processed foods. As certain impurities in these substances have been found to be harmful, it is necessary to have a strict quality control of these food additives. A series of standards was, therefore, prepared to cover purity and identification of these substances. These standards would help in checking purity, which requires to be checked at the stage of manufacture, for it is extremely difficult to detect the impurity once these substances have been added to the processed foods. Besides, these standards are intended to guide the indigenous manufacturers in making their product conform to specifications that are accepted by scientists, health authorities and international bodies.

Use of isopropyl alcohol, food grade is permitted under the *Prevention of Food Adulteration Rules*, 1955 as a solvent in food industry. It is also used as a solvent in the cosmetic, paint and allied industries. An Indian Standard IS 2631 : 1976 'Isopropyl alcohol (*first revision*)' had been published on isopropyl alcohol for industrial uses.

Chemical name — Isopropyl alcohol is also known as propanol-2. Its formula is $(\text{CH}_3)_2\text{CHOH}$.

This standard was first published in 1986 and is being revised for the following reasons:

- a) = To provide a separate clause for description including the solubility property to keep it in line with food chemical codex NRC.
- b) = To upgrade the standard by providing limits and test methods for purity, heavy metals and moisture, and
- c) = To provide for marking instructions for storage and expiry/best before date.

In preparation of this specification, considerable assistance has been derived from the following publications :

Compendium of Food Additive Specifications, Vol 2, Joint FAO/WHO Expert Committee on Food Additives (JECFA), 1992.

This standard is harmonized with the following specifications:

- a) = Specification for identity and purity of food additives, Vol I: Antimicrobial preservatives and antioxidants. 1962. FAO/WHO, Rome.
- b) = Food Chemical Codex, Third Edition. Pub. National Academy of Science, National Research Council. Washington, DC.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)' The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ISOPROPYL ALCOHOL, FOOD GRADE — SPECIFICATION

(*First Revision*)

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for isopropyl alcohol, food grade.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
1070 : 1992	Reagent grade water (<i>third revision</i>)
1260 (Part 1) : 1973	Pictorial markings for handling and labelling of goods: Part 1 Dangerous goods
1448 Part 18 : 1967	Methods of test for petroleum and its products : Part 18 Distillation
1699 : 1995	Methods of sampling and test for synthetic food colours (<i>second revision</i>)
2362 : 1993	Method for determination of water by the Karl Fischer Method (<i>second revision</i>)

3 DESCRIPTION

The material shall be a clear colourless liquid, free from suspended matter, having the characteristic odour of isopropyl alcohol and leaving no residual odour after evaporation from filter paper. The material is miscible without turbidity when diluted to 10 volumes with distilled water at 25°C.

4 REQUIREMENTS

The material shall conform to the requirements given in Table 1.

**Table 1 Requirements for Isopropyl Alcohol,
Food Grade**

SI No.	Characteristic	Limit	Method of Test, Ref to	
			Annex of This Standard	Other Standard
(1)	(2)	(3)	(4)	(5)
i)	Purity as C ₃ H ₈ O percent by mass, <i>Min</i>	99.7	A-1	—
ii)	Relative density at 27/27°C	0.781 to 0.785	A-2	—
iii)	Colour (on platinum-cobalt scale), <i>Max</i>	10	A-3	—
iv)	Distillation range, <i>Max</i>	Not less than 95 ml shall distil within a range of 1°C including 82.3°C (the temperature being corrected* for a pressure of 760 mm Hg)	—	B of IS 1448 [P:18]
v)	Acidity as (CH ₃ COOH), percent by mass, <i>Max</i>	0.001	A-4	—
vi)	Non-volatile matter, g/100 ml, <i>Max</i>	0.001	A-5	—
vii)	Aldehydes and ketones (as acetone), percent by mass, <i>Max</i>	0.1	A-6	—
viii)	Substances reducing permanganate	To pass the test	A-7	—
ix)	Heavy metals, mg/kg, <i>Max</i>	1	A-8	—
x)	Moisture, percent by mass, <i>Max</i>	0.2	A-9	—

*In case the barometric pressure, *P*, deviates from 760 mm Hg, use the correction 0.033 (P-760) degrees celsius for distillation temperature.

5 PACKING, STORAGE AND MARKING

5.1 Packing

The material shall be securely packed in well-fitted containers with minimum access to air and light. The containers shall be such as to preclude contamination of the contents with metals or other impurities.

5.2 Storage

The material shall be stored in a cool and dry place so as to avoid excessive exposure to heat.

5.3 Marking

Each container shall be legibly and indelibly marked with the following information:

- a) = Name of the material including the words 'Food Grade';
- b) = Name and address of the manufacturer;
- c) = Net content when packed;
- d) = Batch or code number;
- e) = Instructions for storage;
- f) = Expiry/best before date; and
- g) = Any other requirements as specified under the *Standards of Weights and Measures (Packaged Commodities) Rules, 1977* and *Prevention of Food Adulteration Rules, 1955*.

5.3.1 Each container shall have the caution label of 'FLAMMABLE' together with the corresponding symbol for labelling of dangerous grade [see Fig. 5 of IS 1260 (Part 1)].

5.3.2 BIS Certification Marking

The containers may also be marked with the BIS Standard Mark.

5.3.2.1 The use of the Standard mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

6.1 The Representative samples of the material shall be drawn according to the method prescribed in 4 of IS 1699.

7 QUALITY OF REAGENTS

Unless specified, otherwise, pure chemicals and distilled water (see IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

(Table 1)

METHODS OF TEST FOR ISOPROPYL ALCOHOL, FOOD GRADE

A-1 DETERMINATION OF PURITY

Purity is determined by gas chromatography method with the following conditions established:

- Column: 1.8 m length, 6 mm diameter steel column packed with 10 percent P.E.G. 400 on chromosorb W(60/80 mesh), or equivalent
- Carrier gas: Helium, at flow rate of 45 ml/min
- Detector: Flame ionization type
- Temperatures; Injection port 150°
- Column: 90°
- Detector: 150°

Inject 1 to 5 µl of sample, obtain chromatogram, and determine the content of each constituent by the method of area normalization.

A-2 DETERMINATION OF RELATIVE DENSITY

A-2.1 Apparatus

A-2.1.1 Relative Density Bottle

50 ml capacity, of Regnault type.

A-2.2 Procedure

Clean, dry and weigh accurately the relative density bottle and the stopper. Fill the bottle with water and immerse it up to the neck in a constant temperature bath at $27 \pm 0.5^\circ\text{C}$ and keep immersed at this temperature for 20 min. Suck off the water with a bit of filter paper till the level reaches the graduation mark and weigh again. Empty the bottle, clean and dry. Repeat the operation with the material at 27°C .

A-2.3 Calculation

$$\text{Relative density at } 27/27^\circ\text{C} = \frac{A - B}{C - B}$$

where

A = mass in g of the relative density bottle with the material at 27°C ,

B = mass in g of the relative density bottle, and

C = mass in g of the relative density bottle with water at 27°C .

A-3 DETERMINATION OF COLOUR (PLATINUM-COBALT SCALE)

A-3.1 Apparatus

A-3.1.1 Spectrophotometer

Equipped for liquid samples and for measurements in the visible region.

A-3.1.2 Spectrophotometer Cells

Matched having a 10 mm light path.

A-3.1.3 Colour Comparison Tubes

Matched 100 ml, tall-form Nessler tubes, provided with ground-on, optically clear, glass caps. Tubes shall be selected so that the height of the 100 ml graduation mark is 275 to 295 mm above the bottom of the tube.

A-3.1.4 Colour Comparator

A colour comparator constructed to permit visual comparison of light transmitted through tall-form, 100 ml Nessler tubes in the direction of their longitudinal axes. The comparator should be constructed so that white light is passed through or reflected off a white glass plate and directed with equal intensity through the tubes, and should be shielded so that no light enters the tubes from the side.

A-3.2 Reagents

A-3.2.1 Cobalt Chloride — ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$).

A-3.2.2 Hydrochloric Acid (sp gr 1.19) —

Concentrated hydrochloric acid (HCL).

A-3.2.3 Potassium Chloroplatinate — (K_2PtCl_6).

NOTE — The spectrophotometer shall be calibrated in accordance with the instructions given in the standards for checking the calibration of spectrophotometer (200 to 1 000 nm).

A-3.2.4 Platinum Cobalt Reference Standards

A-3.2.4.1 Platinum cobalt stock solution

Dissolve 1.245 g of potassium chloroplatinate (K_2PtCl_6) and 1.00 g of cobalt chloride ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$) in water. Carefully add 100 ml of hydrochloric acid (HCL, sp gr 1.19) and dilute to 1 litre with water. The absorbance of 500 platinum cobalt stock solution in a cell having a 10 mm light path must fall within the limits given in Table 2 with reagent water in a matched cell as the reference solution.

**Table 2 Absorbance Tolerance Limits for
No. 500 Platinum Cobalt Stock Solution**

Wavelength nm	Absorbance
(1)	(2)
430	0.110 to 0.120
455	0.130 to 0.145
480	0.105 to 0.120
510	0.055 to 0.065

A-3.2.4.2 Platinum cobalt standards

From the stock solution, prepare colour standards in accordance with Table 3, by diluting the required volumes to 100 ml with water in the Nessler tubes. Cap the tubes and seal the caps with shellac or a waterproof cement. When properly sealed and stored, these are stable for at least 1 year and do not degrade markedly for 2 years.

For a more precise measurement of light colours below 15 platinum cobalt, prepare colour standards from the stock solution in accordance with Table 4 by diluting the required volumes to 100 ml with water in the Nessler tubes. Use a semi-microburet for measuring the required amount of stock solution.

**Table 3 Platinum Cobalt Colour Standards
(Clause A-3.2.4.2)**

Colour Standard Number	Stock Solution ml	Colour Standard Number	Stock Solution ml
5	1	70	10
10	2	100	20
15	3	150	30
20	4	200	40
25	5	250	50
30	6	300	60
35	7	350	70
40	8	400	80
50	10	450	90
60	12	500	100

A-3.3 Procedure

A-3.3.1 Introduce 100 ml of sample into a Nessler tube, passing the sample through a filter if it has any visible turbidity. Cap the tube, place in the comparator, and compare with the standards.

A-3.4 Report

A-3.4.1 Report as the colour the number of the standard that most nearly matches the specimen. In the event that the colour lies midway between two standards, report the darker of the two.

A-3.4.2 If, owing to differences in hue between the specimen and the standards, a definite match cannot be obtained, report the range over which an apparent match is obtained, and report the material as 'off-hue'.

A-4 DETERMINATION OF ACIDITY**A-4.1 Reagents****A-4.1.1 Rectified Spirit**

95 percent.

A-4.1.2 Standard Sodium Hydroxide Solution — 0.1 N.

Table 4 Planinum Cobalt Colour Standards for Very Light Colours (Clause A-3.2.4.2)

Colour Standard Number	Stock Solution ml	Colour Standard Number	Stock Solution ml
1	0.20	9	1.80
2	0.40	10	2.00
3	0.60	11	2.20
4	0.80	12	2.40
5	1.00	13	2.60
6	1.20	14	2.80
7	1.40	15	3.00
8	1.60		

A-4.1.3 Phenolphthalein Indicator

Dissolve 0.5 g of the phenolphthalein in 100 ml of 95 percent rectified spirit. Make the solution faintly pink by adding dilute sodium hydroxide solution.

A-4.2 Procedure

Take 50 ml of rectified spirit, add 0.5 ml of phenolphthalein indicator and neutralize with sodium hydroxide solution. Add 50 ml of the sample. Titrate the mixture immediately with the standard sodium hydroxide solution until the first pink colour persists for at least 10 seconds.

A-4.3 Calculation

$$\text{Acidity (as acetic acid), percent by mass} = \frac{6VN}{50d}$$

where

V = volume in ml of standard sodium hydroxide solution,

N = normality of standard sodium hydroxide solution, and

d = relative density of isopropyl alcohol at the test temperature.

A-5 DETERMINATION OF NON-VOLATILE MATTER**A-5.1 Procedure**

Evaporate 100 ml of the material to dryness in a weighed platinum or silica or borosilicate glass basin on a boiling water-bath. Dry the residue in an oven at a temperature of $100 \pm 2^\circ\text{C}$ to constant mass. Cool in a desiccator and weigh.

A-5.2 Calculation

$$\text{Non-volatile matter, percent by mass} = \frac{M_1}{d}$$

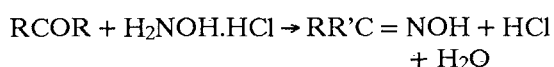
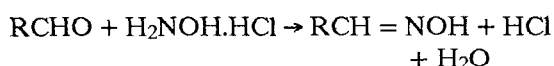
where

M_1 = mass in g of the residue, and

d = relative density of the sample.

A-6 DETERMINATION OF ALDEHYDES AND KETONES**A-6.0 Principle**

Reaction with hydroxylamine hydrochloride forms the basis for the determination of carbonyl function (aldehydes and ketones) according to the equations given below:



The hydrochloric acid released is titrated with standard sodium hydroxide solution using bromophenol blue as indicator.

A-6.1 Reagents**A-6.1.1 Standard Sodium Hydroxide Solution — 0.1 N.****A-6.1.2 Carbonyl-Free Ethanol**

Reflux 500 ml of 95 percent (v/v) ethanol (industrial methylated spirit is not suitable) with 5 g of 2, 4-dinitrophenylhydrazine and 5 drops of concentrated hydrochloric acid of relative density 1.18, for 2 to 3 hours. Distil off the ethanol slowly using a suitable distillation column of size 300×25 mm. Reject the first 50 ml and collect the next 400 ml distillate, rejecting the remainder. If, in spite of the precautions taken, the distillate is found to be coloured, then it should be redistilled.

A-6.1.3 Bromophenol Blue Indicator

Dissolve 0.2 g of bromophenol blue in 3.0 ml of the standard sodium hydroxide solution and dilute to 100 ml with carbonyl-free ethanol.

A-6.1.4 Hydroxylamine Hydrochloride Solution

Dissolve 4 g of hydroxylamine hydrochloride in 20 ml of water. Dilute this to 200 ml with carbonyl-free ethanol, heat on a boiling water-bath for 30 min, cool and add 5 ml of bromophenol blue indicator with just sufficient sodium hydroxide solution (2N) to impart a yellow-green colour to the liquid.

A-6.2 Procedure

Measure 25 ml of the material into a 250 ml conical flask, add 25 ml of hydroxylamine hydrochloride solution and, after loosely stoppering, heat on a boiling water-bath for 10 min. Cool and titrate with standard sodium hydroxide solution until as near a match as possible is obtained with a control made by mixing 25 ml of distilled water with 25 ml of hydroxylamine hydrochloride in a similar 250 ml conical flask.

A-6.3 Calculation

Aldehydes and ketones (as acetone), percent by mass

$$= \frac{0.023 V}{d}$$

where

V = volume in ml of standard sodium hydroxide solution used, and

d = relative density of the material taken at the temperature of the test.

**A-7 SUBSTANCES REDUCING
PERMANGANATE TEST****A-7.1 Apparatus**

A-7.1.1 Glass - Stoppered Cylinder — 50 ml capacity.

A-7.2 Reagent

A-7.2.1 Potassium Permanganate — 0.1 N.

A-7.3 Procedure

Transfer 50 ml of the sample into the glass stoppered cylinder, add 0.25 ml of the potassium permanganate, mix and allow to stand for ten minutes. The sample shall be considered to have passed the test if the pink colour is not entirely discharged.

A-8 TEST FOR HEAVY METALS

Evaporate 25 ml (about 20 g) of the sample to dryness on a steam bath in a glass evaporating dish. Cool, add 2 ml of hydrochloric acid, and slowly evaporate to dryness again on the steam bath. Moisten the residue with 1 drop of hydrochloric acid, add 10 ml of hot water, and digest for 2 min. Cool, and dilute to 25 ml with water. This solution meets the requirements of the Heavy Metals when tested as per 16 of IS 1699, using 20 μ g of lead ion (Pb) in the control (Solution A).

A-9 TEST FOR MOISTURE

Determine the moisture content by the Karl Fischer method as per IS 2362.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. FAD 8 (724).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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